

**Fig.1** The increase in circumference is dependent on the relation between width vs. depth of a channel ( $s = \text{width/depth}$ ). The cross section is constant. For example: A channel, which is 10 times wider than deep has an increase of more than 50% capillary force in comparison to a square one.

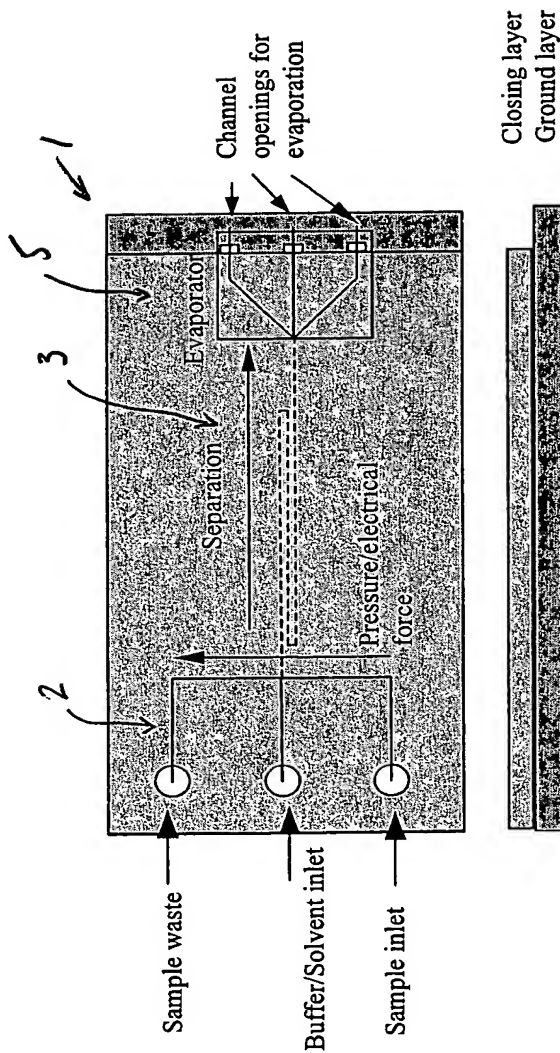


Fig. 2

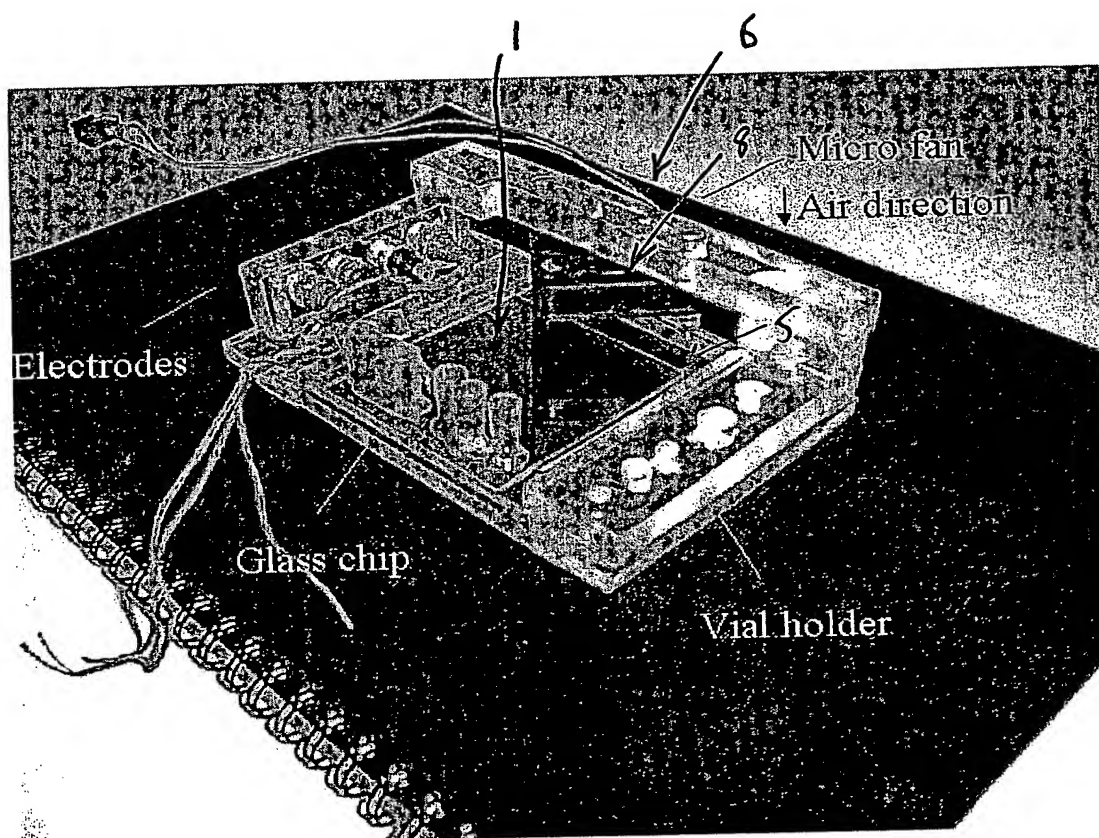


Fig. 3 Chip holder for 3in x 3in glass chips compatible with standard microscope stages; includes a micro fan for constant "fresh" air, vial holders and electrodes for sample injection

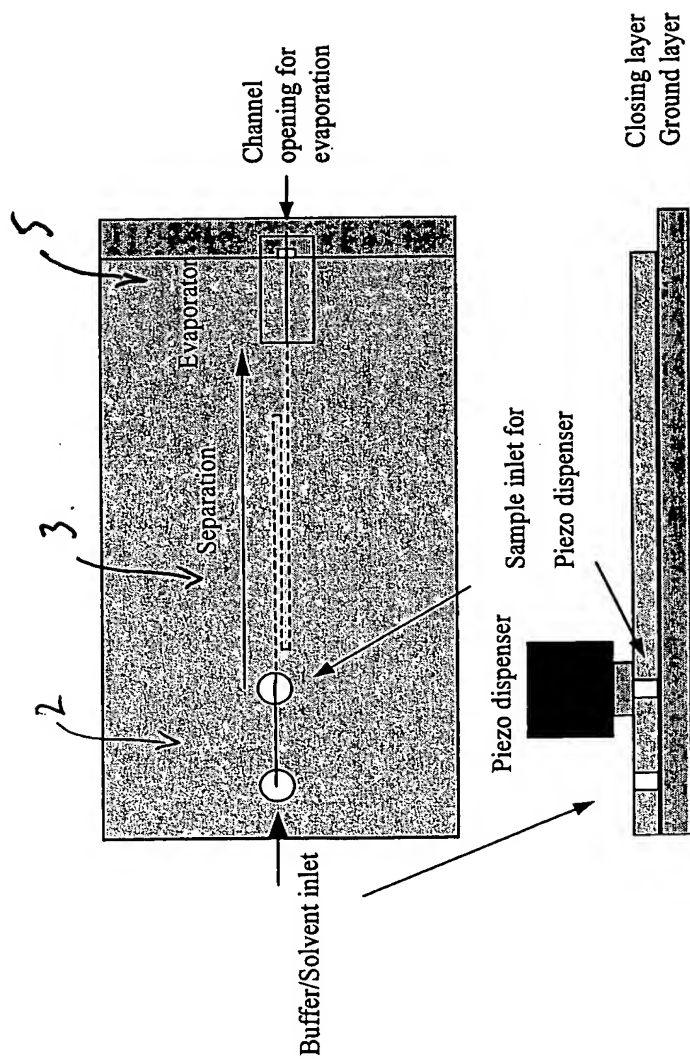
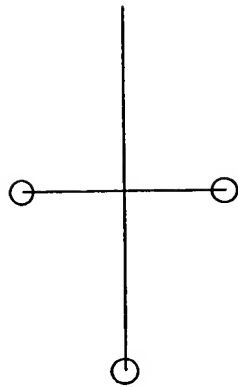


Fig. 4.

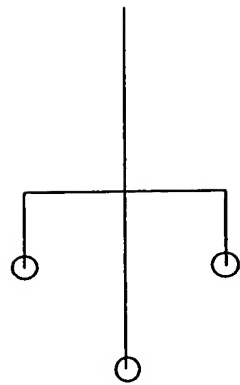


# Inlets



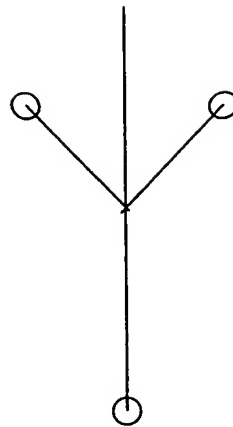
T-Inlet classic

fig 5(a)



T-Inlet, modified

fig. 5(b)



T-Inlet, anti-stream

fig. 5(c)



Inject-Inlet

Fig. 5(d)

# Separation Channel

Single channel straight

Fig. 6(a)

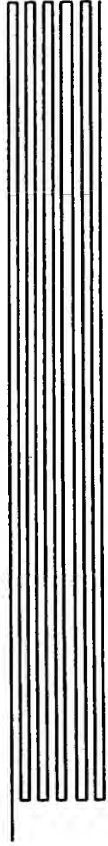


Fig. 6(b)

Single channel meander

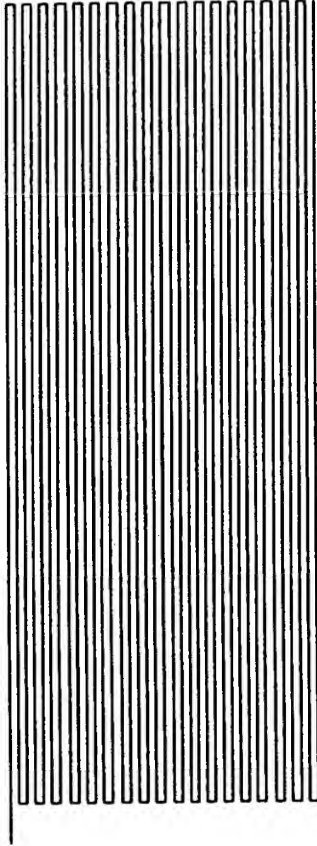
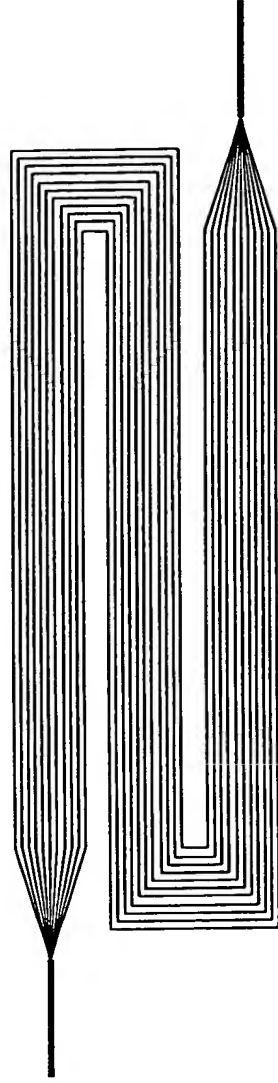


Fig. 6(c)

Single channel meander extra long



Channel bundle parallel, meander

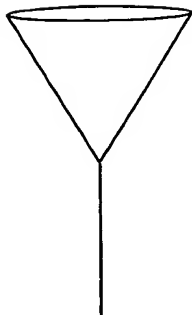
Fig. 6(d)

# Evaporators



Single channel

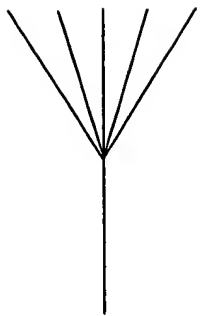
fig. 7(a)



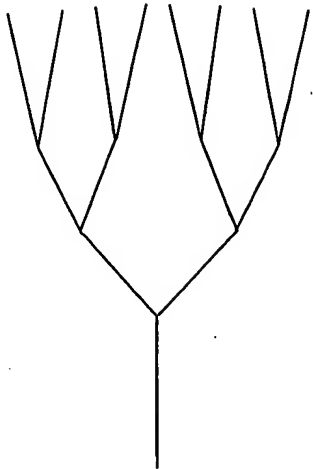
Funnel-shape

fig. 7(b)

# Multi Channel Evaporators



Umbel-Shape Fig. 8(a)



Root-Shape Fig. 8(b)

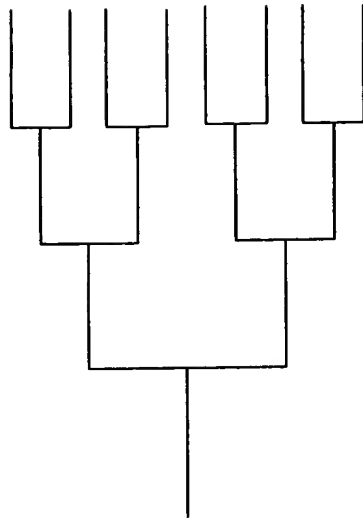


Fig. 8(c)

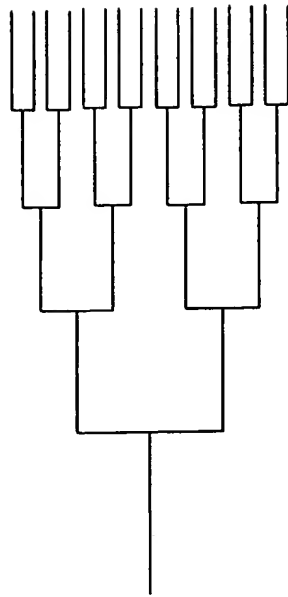
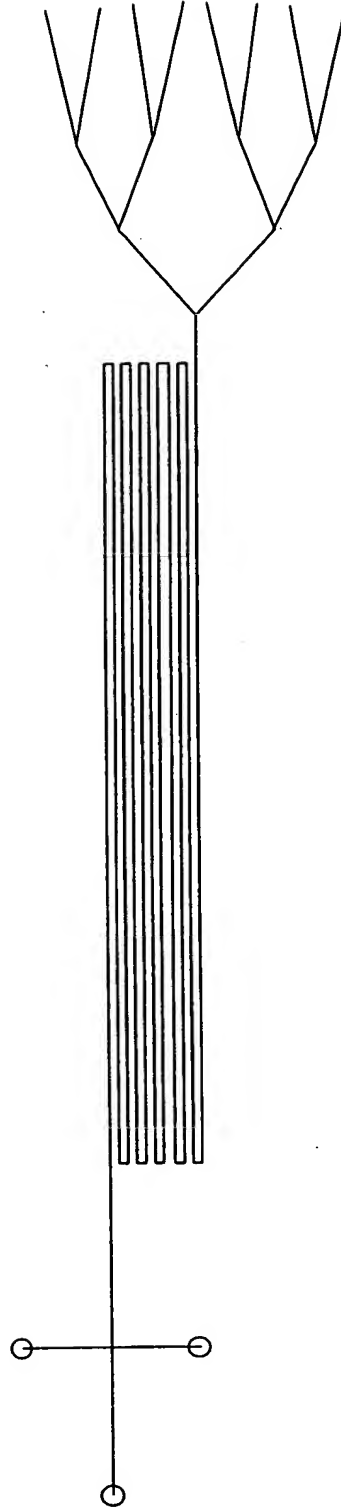


Fig. 8(d)

1:1 Splitter, rectangular 3-fold

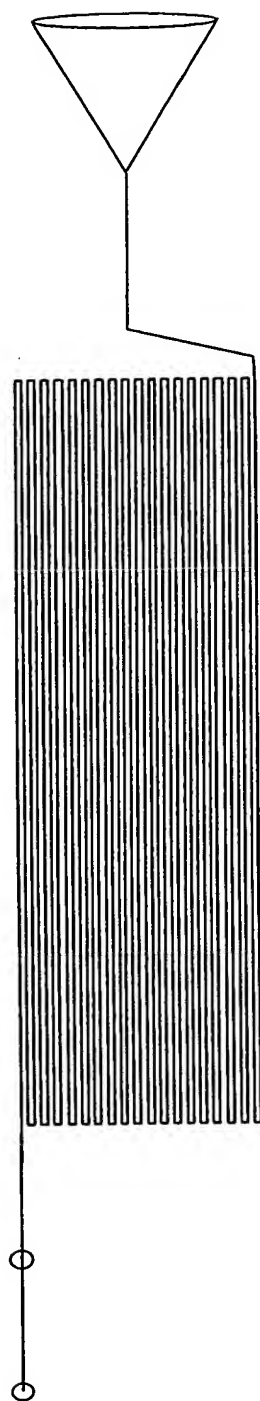
1:1 splitter, rectangular 4-fold

Fig 9'

Chip design with classic T-inlet and medium length meander single channel  
Separator including multi channel root-shape evaporator; all channel  
dimensions are the same (10 $\mu$ m wide and 0.5 $\mu$ m deep)

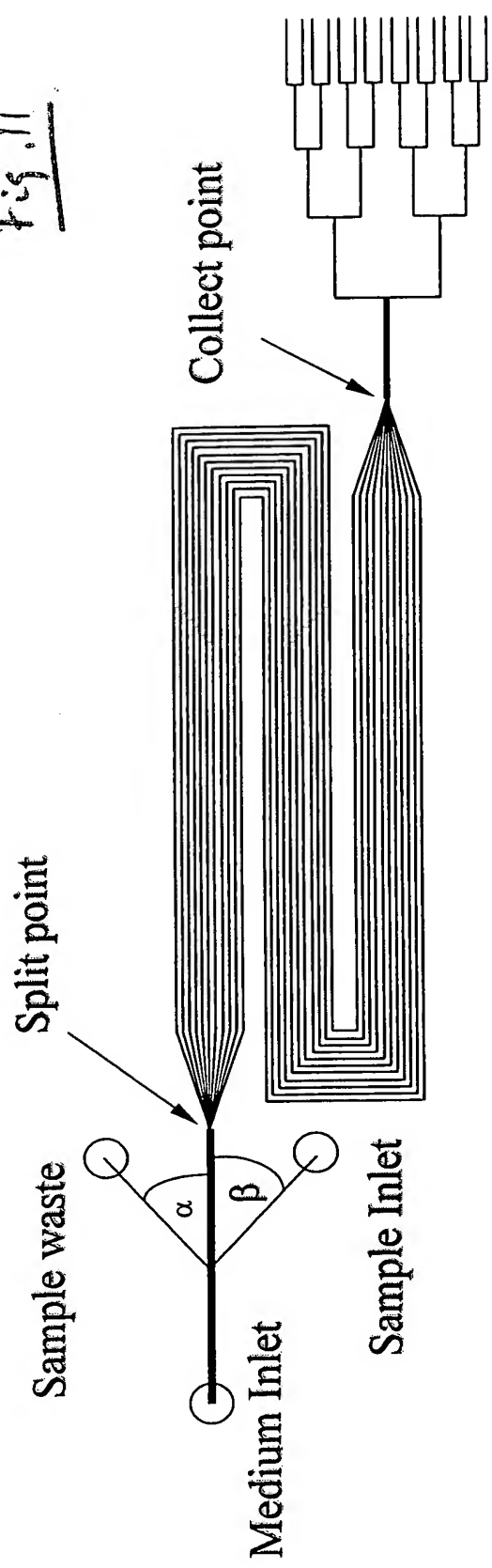
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Fig. 10.

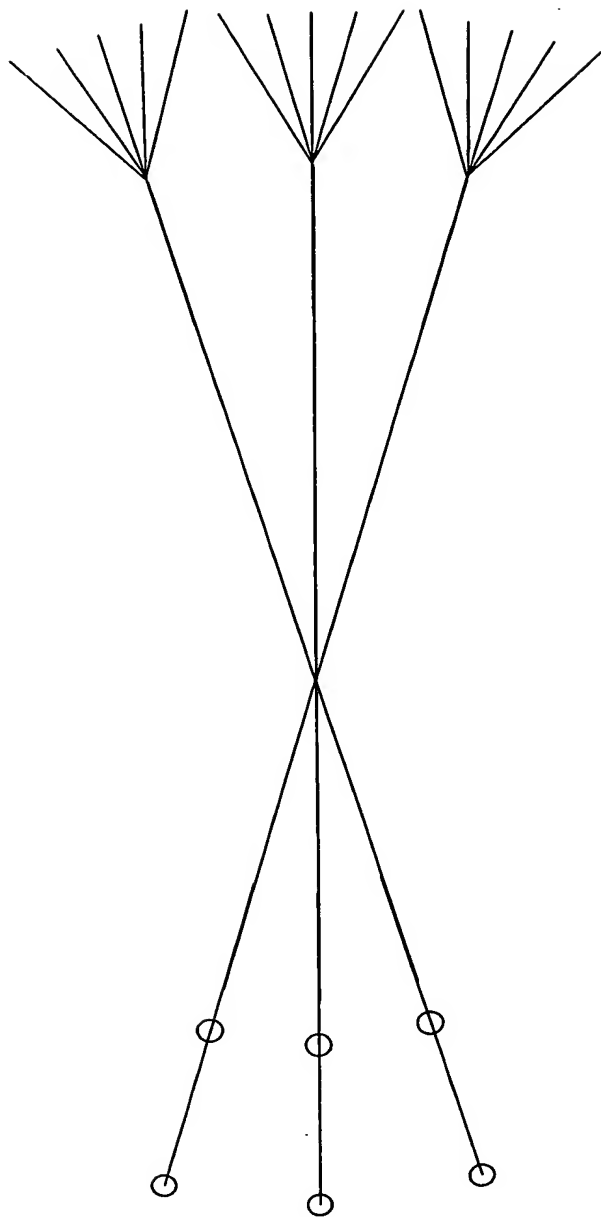


Chip design with inject-inlet including extra long single meander channel for separation.; funnel-evaporator

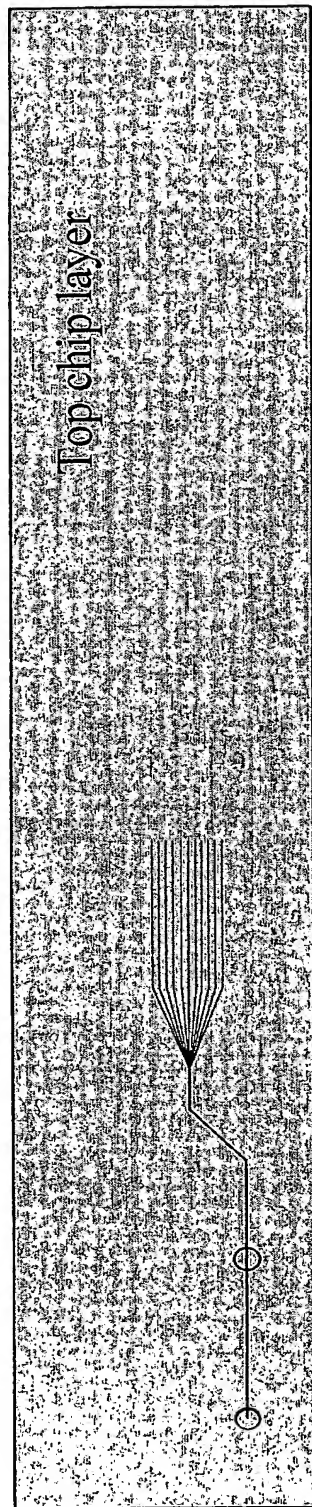
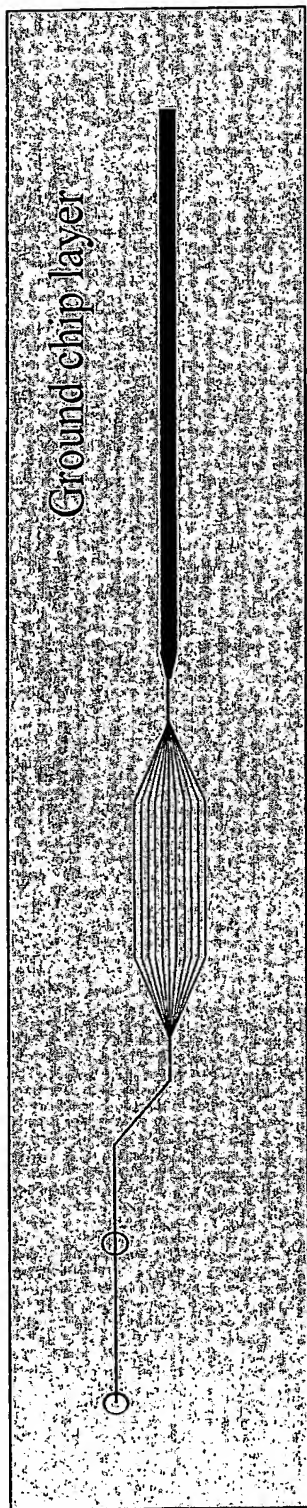
Fig. 11



Chip design including an anti-stream inlet with different angles ( $\alpha$ ,  $\beta$ ) for sample inlet and sample waste, channel dimensions vary between the different regions; bundle of 11 separation channels meandering parallel; evaporator 4-fold 1:1 splitter

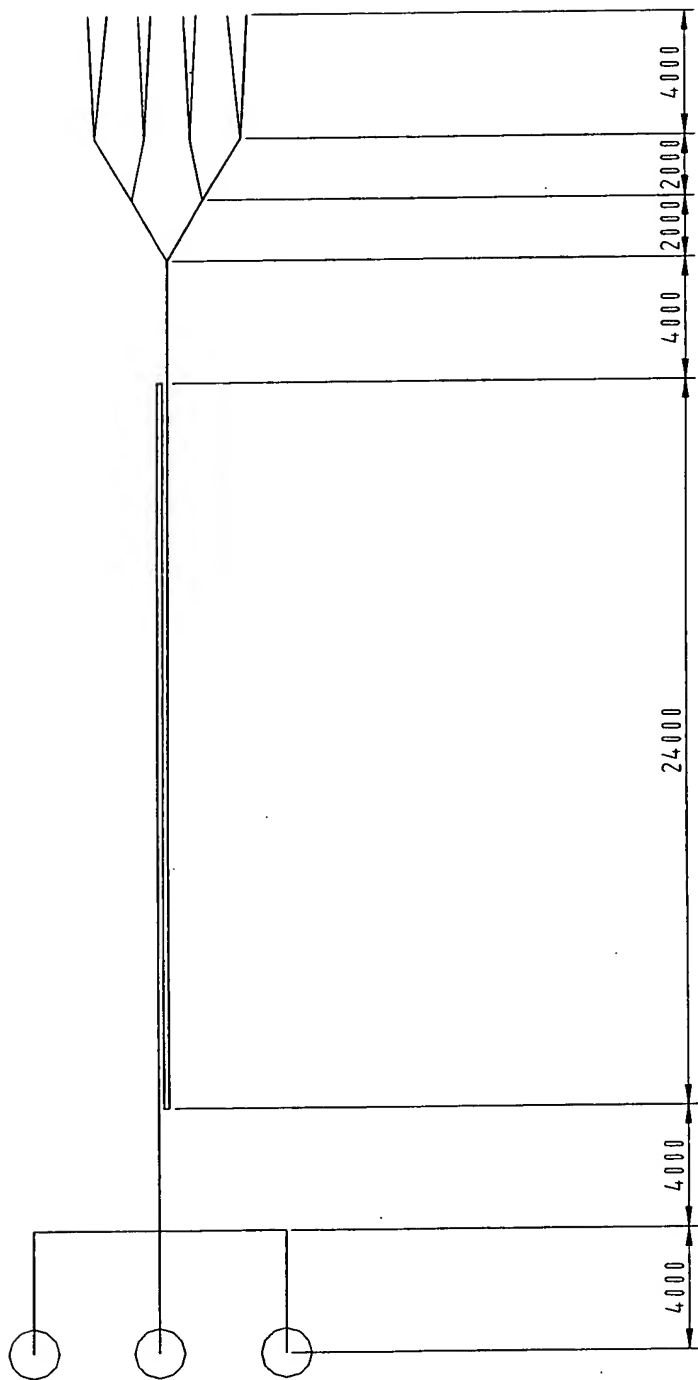
Fig. 12

Chip design for a three compound synthesis including three umbel-shape evaporators and three inject-inlets



Chip design for Immuno-assays including two inject-inlets on two different layers and following "Bessoth-mixer" (Lit); single wide channel evaporator

Fig. 13



design pop02; created 04-04-2000 @ Nils Goedecke

Channel width 110  $\mu\text{m}$  after etching, depth 25  $\mu\text{m}$  over the whole structure

Fig. 14(a)

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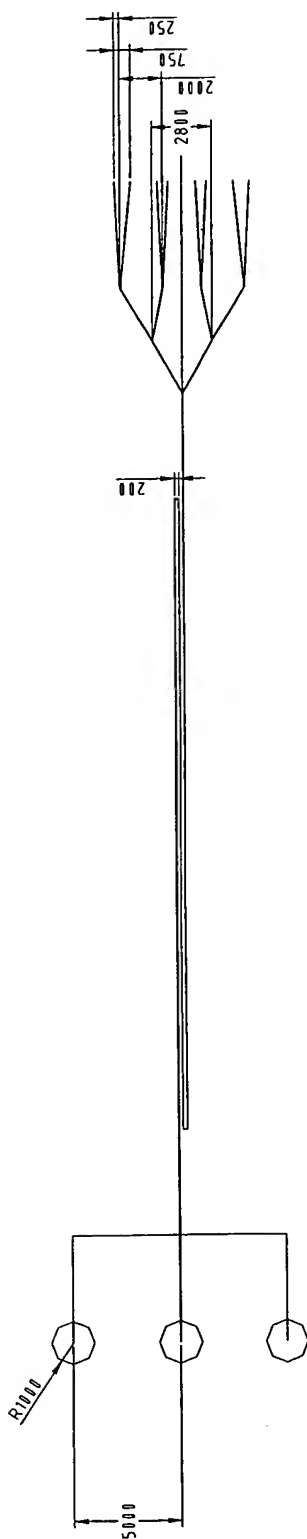


Fig. 14(b)

design popl2, created 04-04-2000 @ Nils Goedecke

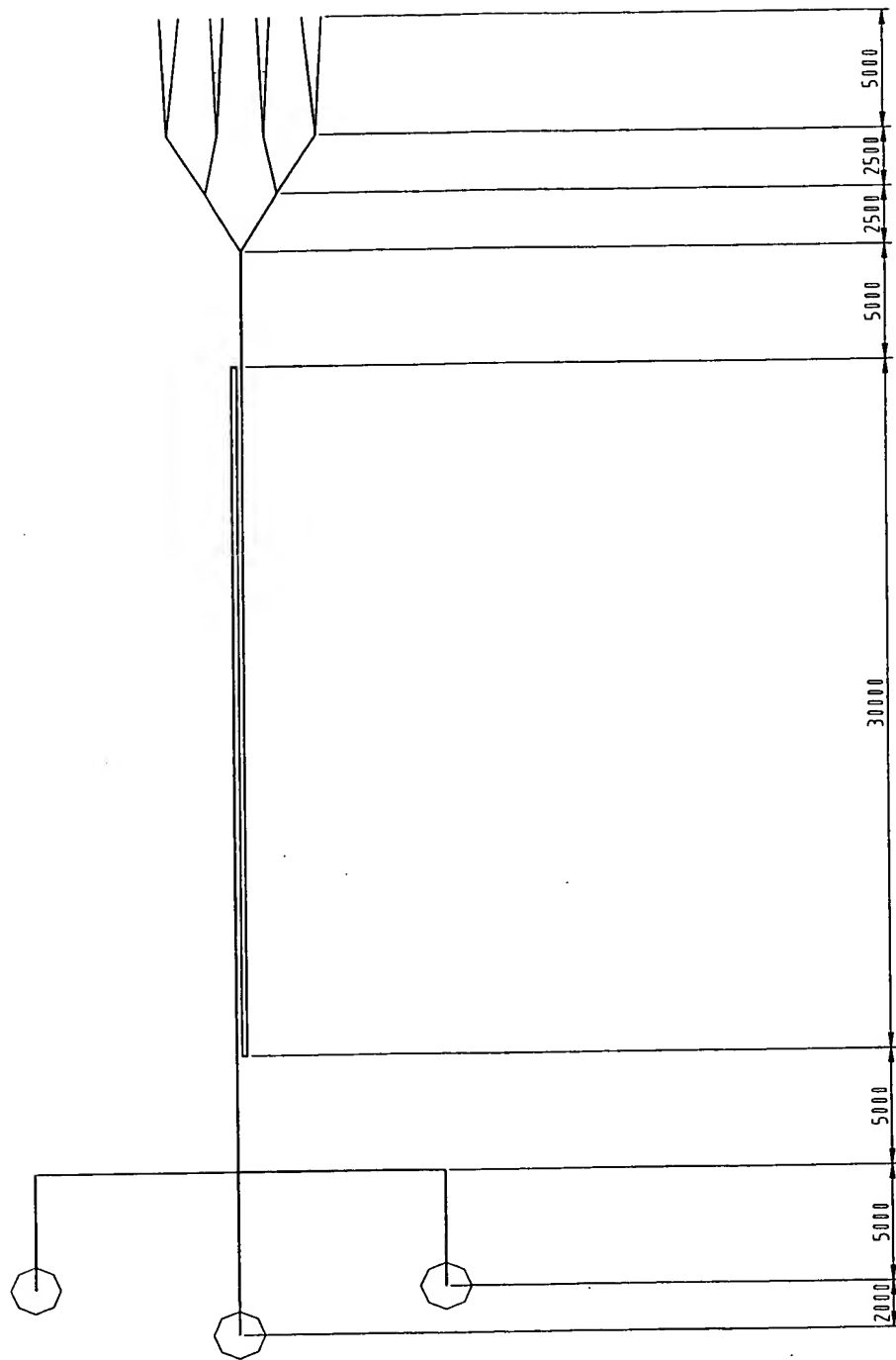


Fig. 15(a)

channel width 40 microns for each design

design pop03a by Nils Goedecke 23. June 2000 IC Department of Chemistry

Channel width after etching 60 $\mu$ m; depth 10  $\mu$ m



channel width 40 microns for each design

design pop03a by Nils Goedecke 23. June 2000 IC Department of Chemistry

Fig. 15(b)

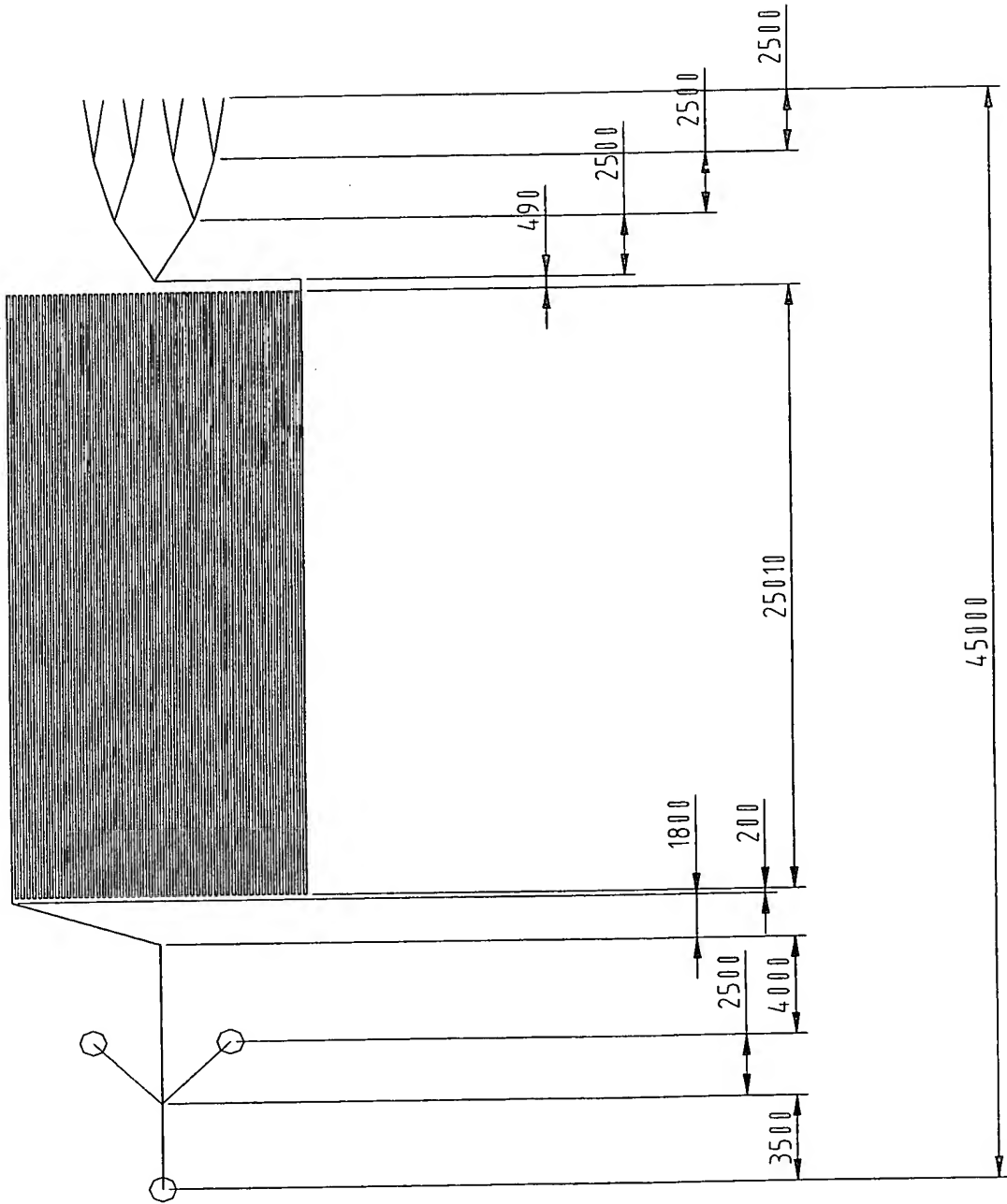
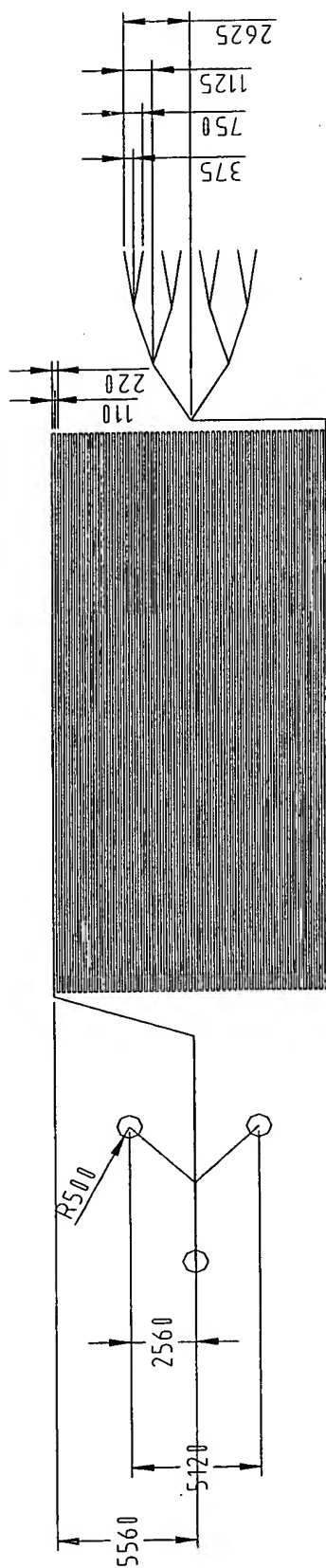


Fig. 16 (a)



This layout includes the anti-stream-inlet and a 2.5m separation channel. Theoretically, a channel of this length  $10\mu\text{m}$  wide and  $0.1\mu\text{m}$  deep if running with a  $\eta \sim 40$  has an efficiency of more than 500000 theoretical plates in 10 min run time.

Design lim 01: S.I. 5; Sep.Ch.W. 10; EVvap.Ch.W.10 by Nils Goedecke 05.07.2000

Fig. 16 (b)

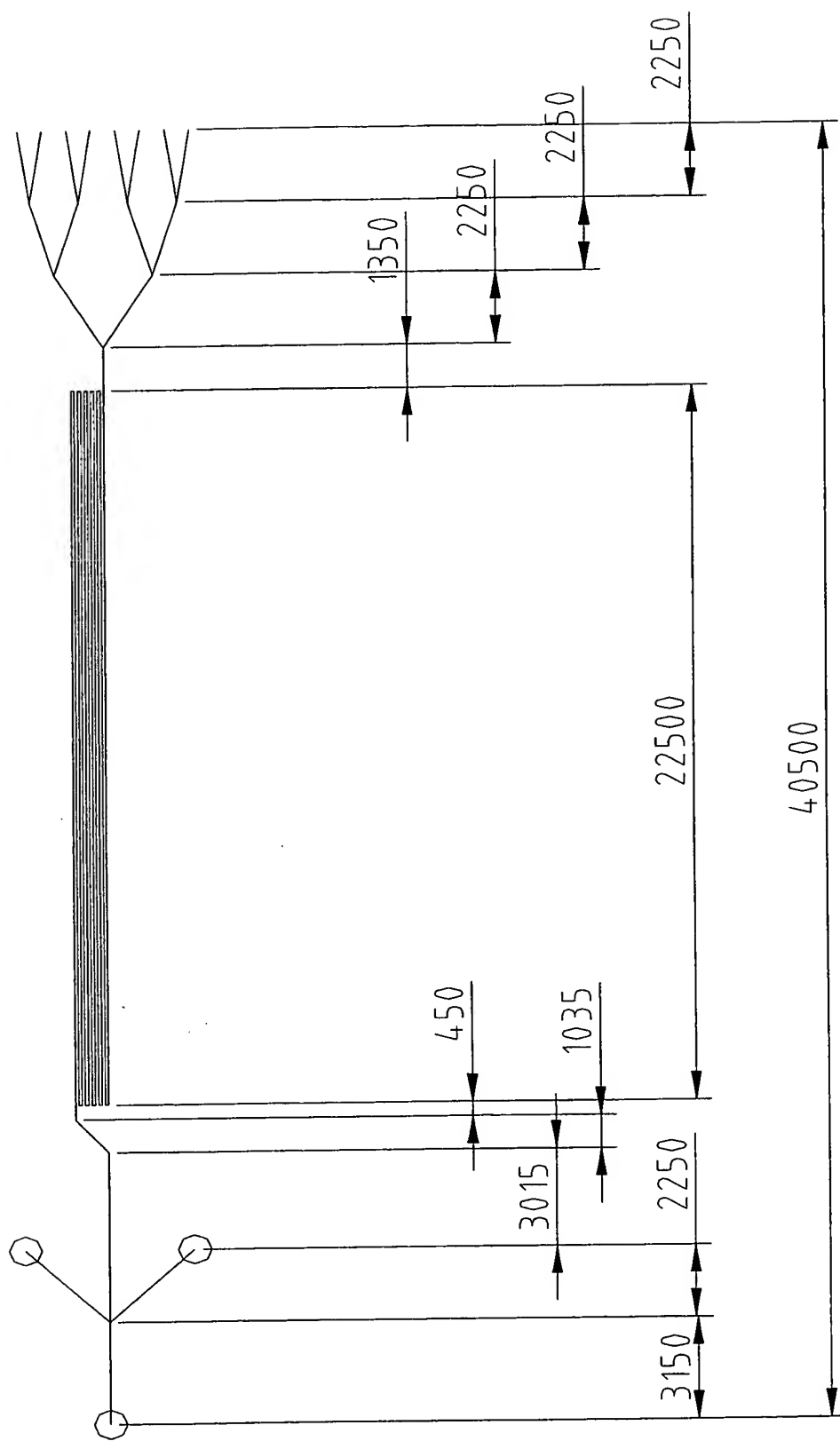
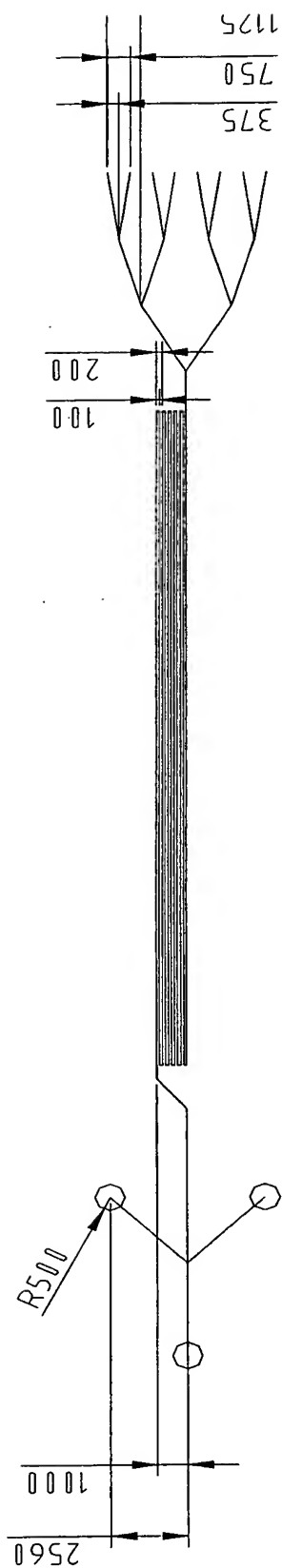


Fig. 17(a)

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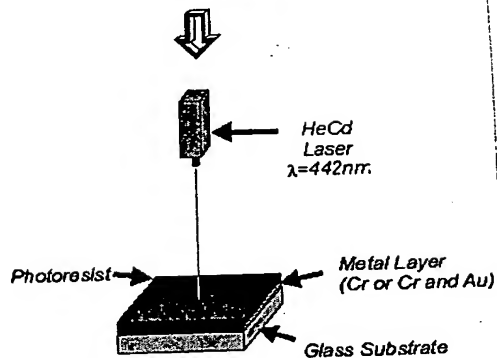
Design lim 02 S.I. 5 Sep.Ch.W. 10 EVvap.Ch.W.10 by Nils Goedecke 09.11.2000

Fig. 17(b)

a). Design structure  
using CAD package  
and convert to  
machine format



b). Expose  
photoresist  
using DWLII  
system



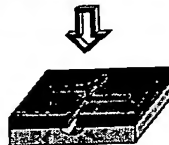
c). Develop  
photoresist



d). Etch Metal  
Layer



e). Etch Glass



f). Remove Photoresist  
and Metal Layer  
Thermally bond to  
coverplate

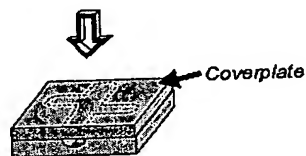
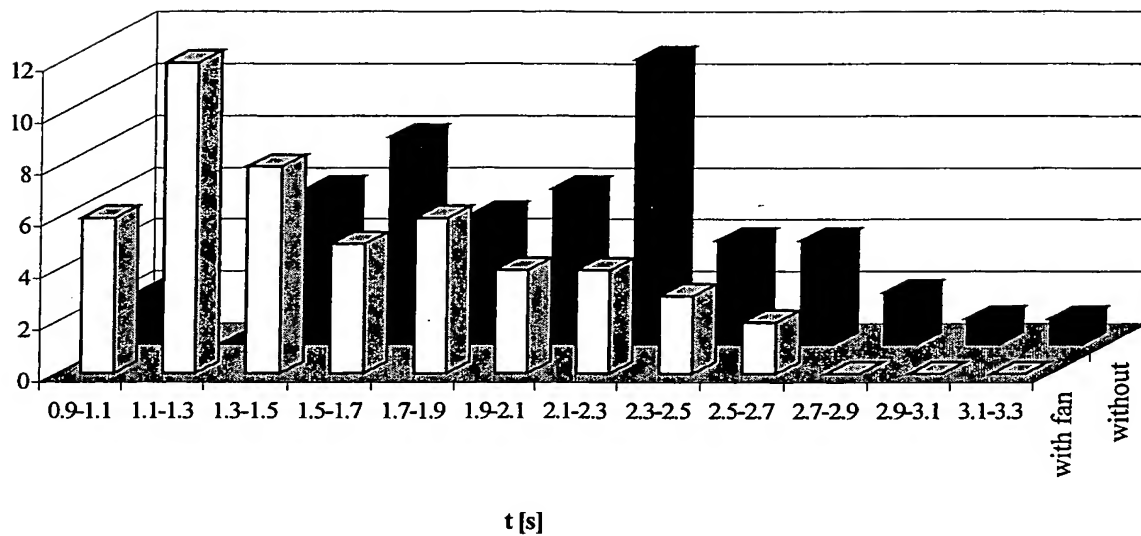


Fig. 18



Velocity differences within the channel ( $60 \times 20 \mu\text{m}$ ) for  $10 \mu\text{m}$  latex beads in a pop02 chip driven through evaporation with and without "air condition"; measurement with 50 beads each; The average velocity with the "air condition" switched on is slightly higher than without it – visible in the left shift of the profile.

Fig. 19